ABSTRACT:

This paper addresses the mesh-dependence of non-linearmechanicalfiniteelementanalysis. To this end, finiteelementmeshes that are assembled by various element types and their solutions are compared. Voxel, tetrahedron, hexahedron and mixed (hex-dominant) meshes are considered. Different benchmarking parameters for the elastic and plastic solutions as well as for the computational load are determined. First, bending beams with a square, a circular and a rail cross-section are calculated accounting for non-linear material behaviour (plasticity). A strong dependence on the mesh type is observed and the best results are obtained for mixed meshes and hexahedron-only meshes. In the second part of this study, finiteelement models that are based on the complex geometry of metallic foam are considered. Computed tomography data is used to generate geometrically complex finiteelement models and a convergence analysis is performed. Again, superior performance is found for mixed meshes.